

ILLUMINATION APPARATUS FOR A MOTOR VEHICLE

This nonprovisional application is a continuation of International Application

[0001] No. PCT/EP2019/079793, which was filed on Oct. 31, 2019, and which claims priority to German Patent Application No. 10 2019 109 743.6, which was filed in Germany on Apr. 12, 2019, and which are both herein incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a lighting device for a motor vehicle, in particular a headlamp device for a motor vehicle, as well as a lighting device for a motor vehicle, in particular a headlamp device for a motor vehicle.

Description of the Background Art

[0003] A lighting device is known from EP 2 690 351 A2, which corresponds to US 2014/0029289. The headlamp device described therein comprises a first headlamp, which has a first light module for generating a first light distribution as well as a second light module for generating a second light distribution. The headlamp device further comprises a second headlamp, which has a first light module for generating a first light distribution as well as a second light module for generating a second light distribution. The first light modules of the headlamps are each designed as high-resolution light modules, the first light distributions of the headlamps each having a higher resolution than the second light distributions. Headlamps which include high-resolution light sources are expensive, have a complex structure, and are complex in terms of their operation.

[0004] Another lighting device is known from DE 10 2013 224 152 A1. The headlamp device described therein comprises a first headlamp and a second headlamp, which each have a high-beam module and a low-beam module. The two low-beam modules are configured to carry out a welcome scenario. When the driver approaches with the key to the motor vehicle, the low-beam modules are turned on, the resulting light cone, for example, being moved upward from below to indicate a wakeup.

SUMMARY OF THE INVENTION

[0005] It is therefore an object of the present invention to provide a lighting device, which is cost-effective despite the possibility of generating a high-resolution light distribution. The object of the present invention is furthermore to provide a lighting device which may be used more flexibly.

[0006] In an exemplary embodiment, it is provided that the first light distribution of the first headlamp has a higher resolution than the first light distribution of the second headlamp and than the second light distribution of the second headlamp. It is therefore possible to optimize one of the two headlamps with regard to cost and to optimize the other of the two headlamps with regard to graphics capability. It therefore permits the use of different high-resolution light modules in the first and second headlamps from the first light module in each case to save costs in the overall system. The control electronics may also be simplified because, for

example, fewer pixels overall need to be calculated than in two light modules which both have a high resolution.

[0007] The two headlamps are, for example, a headlamp installed in the right front of the vehicle and a headlamp installed in the left front of the vehicle. Either the right or the left headlamp may have a higher-resolution first light distribution.

[0008] It may be provided that the first light distribution of the second headlamp has a higher resolution than the second light distribution of the second headlamp.

[0009] It is possible that the first light module of the first headlamp and/or the first light module of the second headlamp comprise(s) a light source, preferably a high-resolution light source, in particular the light source including a solid-state LED array or a high-resolution LED matrix or elements for the high-resolution light modulation, such as a digital micromirror device (DMD) or an LCoS or an LC display. All of these elements permit the generation of a high-resolution light distribution. According to the invention, however, the first light distribution of the first headlamp has a higher resolution than the first light distribution of the second headlamp.

[0010] It may be provided that the first light module of the first headlamp and the first light module of the second headlamp may each generate a multiplicity of individually controllable light points.

[0011] The number of light points individually controllable by the first light module of the first headlamp may be greater than 2,000, in particular greater than 5,000, preferably approximately equal to 10,000 or greater than 10,000. In particular, the first light module of the first headlamp may comprise a solid-state LED array for this purpose, which may generate, in particular, 10,000 or more individually controllable light points.

[0012] The number of light points individually controllable by the first light module of the second headlamp may be less than 1,000, in particular less than 200, preferably approximately equal to 100 or less than 100. In particular, the first light module of the second headlamp may comprise an LED matrix for this purpose, which includes, in particular, two rows of light-emitting diodes, the LED matrix preferably comprising 84 or 100 individual light-emitting diodes (LEDs), which may generate 84 or 100 individually controllable light points.

[0013] The costs may be reduced hereby, in particular in comparison with a headlamp system with two identical headlamps, which each include a solid-state LED array. The resolution may be improved overall compared to headlamp systems, which each include two LED matrix system of, for example, 100 light-emitting diodes each.

[0014] It is possible that the second light module of the first headlamp and the second light module of the second headlamp have the same design or comprise light sources of the same design.

[0015] It may be provided that the second light module of the first headlamp and/or the second light module of the second headlamp comprise(s) an LED module, which includes fewer than 20, in particular fewer than 10, light-emitting diodes, or that the second light module of the first headlamp and/or the second light module of the second headlamp comprise(s) an LED matrix module or another high-resolution light source. However, they should have a lower resolution than the first light modules.